

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) An apparatus for controlling the temperature of an electronic device under test, said apparatus comprising:
 - a thermal head having a temperature controlled surface for making thermal contact with said electronic device;
 - said thermal head defining a flow channel for passage of a refrigerant fluid so as to cause transfer of thermal energy between said electronic device and said thermal head;
 - a refrigeration system in fluid communication with said flow channel of said thermal head to supply refrigerant fluid thereto;
 - said refrigeration system including a metering valve operative to regulate flow of said refrigerant fluid, said metering valve being located operatively adjacent said flow channel of said thermal head so as to regulate introduction of said refrigerant fluid into said thermal head; and
 - a controller operative to control said metering valve for maintaining a predetermined temperature at said temperature controlled surface.
2. (Original) An apparatus as set forth in claim 1, wherein said refrigeration system includes a capillary tube having a first end and a second end, said second end of said capillary tube being in fluid communication with an inlet of said flow channel of said thermal head.
3. (Original) An apparatus as set forth in claim 2, wherein said metering valve is located at said first end of said capillary tube.
4. (Original) An apparatus as set forth of claim 1, wherein said controller is adapted to allow said predetermined temperature to be varied by a user.
5. (Original) An apparatus as set forth in claim 4, wherein said metering valve is a pulsing valve operated by a pulse width modulated (PWM) signal.

6. (Original) An apparatus as set forth in claim 4, wherein said pulsing valve is actuated at least once per second.

7. (Original) An apparatus as set forth in claim 4, wherein said controller is a PID controller.

8. (Original) An apparatus as set forth in claim 1, wherein said thermal head further includes at least one heater device, operation of said heater device also being controlled by said controller.

9. (Original) An apparatus as set forth in claim 8, wherein said at least one heater device comprises a plurality of cartridge heaters.

10. (Original) An apparatus for controlling the temperature of an electronic device under test, said apparatus comprising:

a refrigeration system including a compressor and a condenser, said refrigeration system being operative to circulate a refrigerant fluid through a fluid flow loop such that said refrigerant fluid will change between gaseous and liquid states so as to alternately absorb and release thermal energy;

a thermal head having a temperature controlled surface, said thermal head defining a flow channel for passage of said refrigerant fluid to thereby function as an evaporator in said refrigeration system; and

a metering valve located operatively adjacent said evaporator in said fluid flow loop, said metering valve being operative to regulate introduction of said refrigerant fluid into said flow channel of said thermal head for maintaining a predetermined temperature at said temperature controlled surface.

11. (Original) An apparatus as set forth in claim 10, wherein said refrigeration system includes a capillary tube having a first end and a second end, said second end of said capillary tube being in fluid communication with an inlet of said flow channel of said thermal head.

12. (Original) An apparatus as set forth in claim 11, wherein said metering valve is located at said first end of said capillary tube.

13. (Original) An apparatus as set forth in claim 12, wherein said metering valve is a pulsing valve operated by a pulse width modulated (PWM) signal.

14. (Currently Amended) An apparatus as set forth in claim 13, further comprising a controller for producing said ~~PWN~~ PWM signal, said controller adapted to allow said predetermined temperature to be varied by a user.

15. (Original) An apparatus as set forth in claim 14, wherein said controller is a PID controller.

16. (Original) An apparatus as set forth in claim 10, wherein said thermal head further includes at least one heater device operative to supply thermal energy to said temperature controlled surface when necessary to maintain said predetermined temperature.

17. (Original) An apparatus as set forth in claim 16, wherein said at least one heater device comprises a plurality of cartridge heaters.

18. (New) An apparatus as set forth in claim 1, wherein said metering valve is located within 18 inches of an inlet of said flow channel of said thermal head.

19. (New) An apparatus as set forth in claim 18, wherein said refrigeration system includes a capillary tube having a first end and a second end, said second end of said capillary tube being in fluid communication with said inlet of said flow channel of said thermal head, and

wherein said metering valve is located at said first end of said capillary tube.

20. (New) An apparatus as set forth in claim 19, wherein said capillary tube has a length of no more than 12 inches.

21. (New) An apparatus as set forth in claim 1, wherein said thermal head functions as an evaporator in said refrigeration system.

22. (New) An apparatus as set forth in claim 1, wherein said thermal head is adapted to mate with a socket cover of a test fixture configured to receive a device under test.

23. (New) An apparatus as set forth in claim 1, further including a gimbal assembly adapted to provide even mating between the thermal head and a device under test.

24. (New) An apparatus as set forth in claim 1, wherein said thermal head is made a thermally conductive material and has low thermal mass to facilitate rapid transfer of thermal energy.

25. (New) An apparatus as set forth in claim 1, wherein said thermal head is made a thermally conductive material and has low thermal mass to facilitate rapid transfer of thermal energy.

26. (New) An apparatus as set forth in claim 10, wherein said metering valve is located within 18 inches of an inlet of said flow channel of said thermal head.

27. (New) An apparatus as set forth in claim 26, wherein said refrigeration system includes a capillary tube having a first end and a second end, said second end of said capillary tube being in fluid communication with said inlet of said flow channel of said thermal head, and

wherein said metering valve is located at said first end of said capillary tube.

28. (New) An apparatus as set forth in claim 27, wherein said capillary tube has a length of no more than 12 inches.

29. (New) An apparatus as set forth in claim 10, wherein said thermal head is adapted to mate with a socket cover of a test fixture configured to receive a device under test.

30. (New) An apparatus as set forth in claim 10, further including a gimbal assembly adapted to provide even mating between the thermal head and a device under test.

31. (New) An apparatus as set forth in claim 10, wherein said thermal head is made a thermally conductive material and has low thermal mass to facilitate rapid transfer of thermal energy.

32. (New) An apparatus as set forth in claim 10, wherein said thermal head is made a thermally conductive material and has low thermal mass to facilitate rapid transfer of thermal energy.

33. (New) An apparatus for controlling the temperature of an electronic device under test, said apparatus comprising:

a refrigeration system including a compressor and a condenser, said refrigeration system being operative to circulate a refrigerant fluid through a fluid flow loop such that said refrigerant fluid will change between gaseous and liquid states so as to alternately absorb and release thermal energy;

a thermal head having a temperature controlled surface configured to be in thermal contact with said electronic device under test, said thermal head defining a flow channel for passage of said refrigerant fluid to thereby function as an evaporator in said refrigeration system; and

a metering valve located within 18 inches of said evaporator in said fluid flow loop, said metering valve being operative to regulate introduction of said refrigerant fluid into said flow channel of said thermal head for maintaining a predetermined temperature at said temperature controlled surface.

34. (New) An apparatus as set forth in claim 33, wherein said refrigeration system includes a capillary tube having a first end and a second end, said second end of said capillary tube being in fluid communication with said inlet of said flow channel of said thermal head.

35. (New) An apparatus as set forth in claim 34, wherein said capillary tube has a length of no more than 12 inches.

36. (New) An apparatus as set forth in claim 33 herein said thermal head is adapted to mate with a socket cover of a test fixture configured to receive a device under test.

37. (New) An apparatus as set forth in claim 33 further including a gimbal assembly adapted to provide even mating between the thermal head and a device under test.

38. (New) An apparatus as set forth in claim 33, wherein said thermal head is made a thermally conductive material and has low thermal mass to facilitate rapid transfer of thermal energy.